W. M. LUTHER.

FRUIT EVAPORATOR.

APPLICATION FILED NOV. 26, 1913.

1,132,020. Patented Mar. 16, 1915.

2 SHEETS—SHEET 1.

Fig. 2

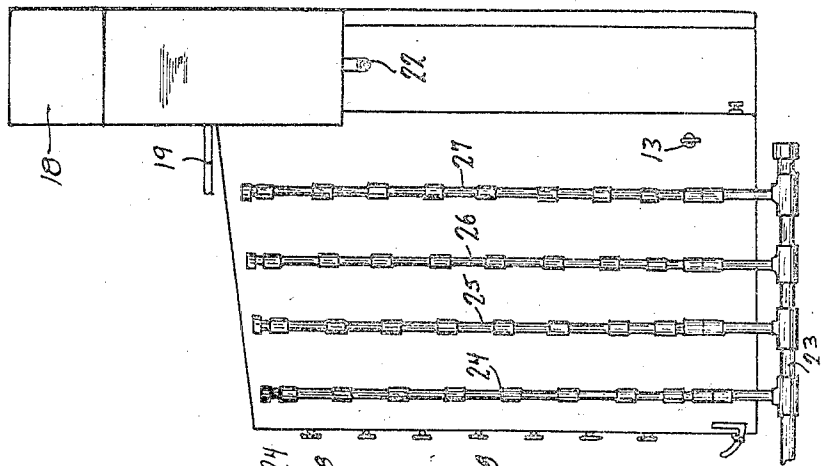
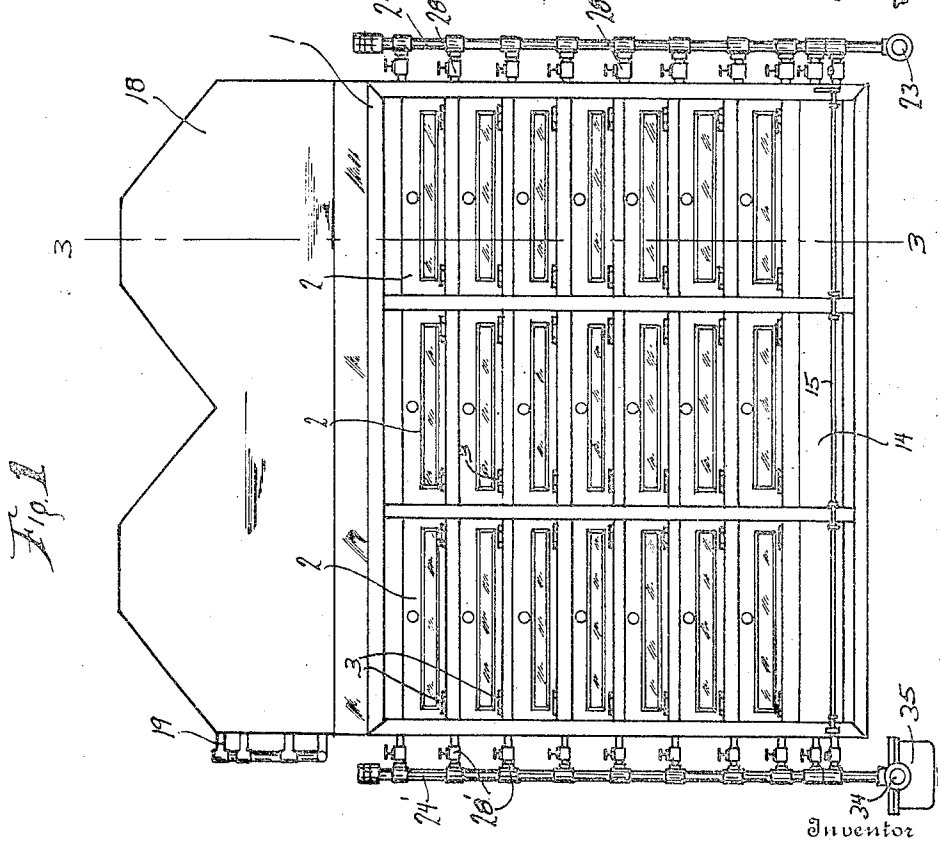



Fig. 1




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2 SHEETS—SHEET 2.

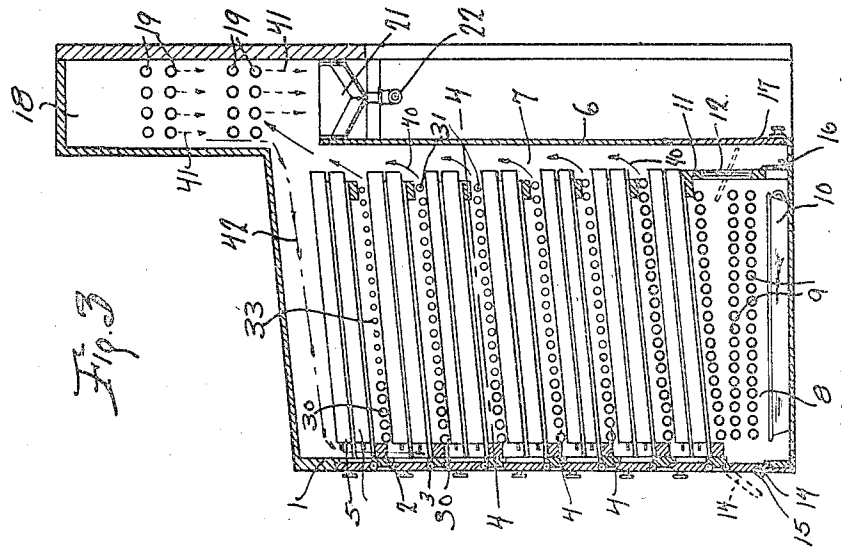


Fig. 3

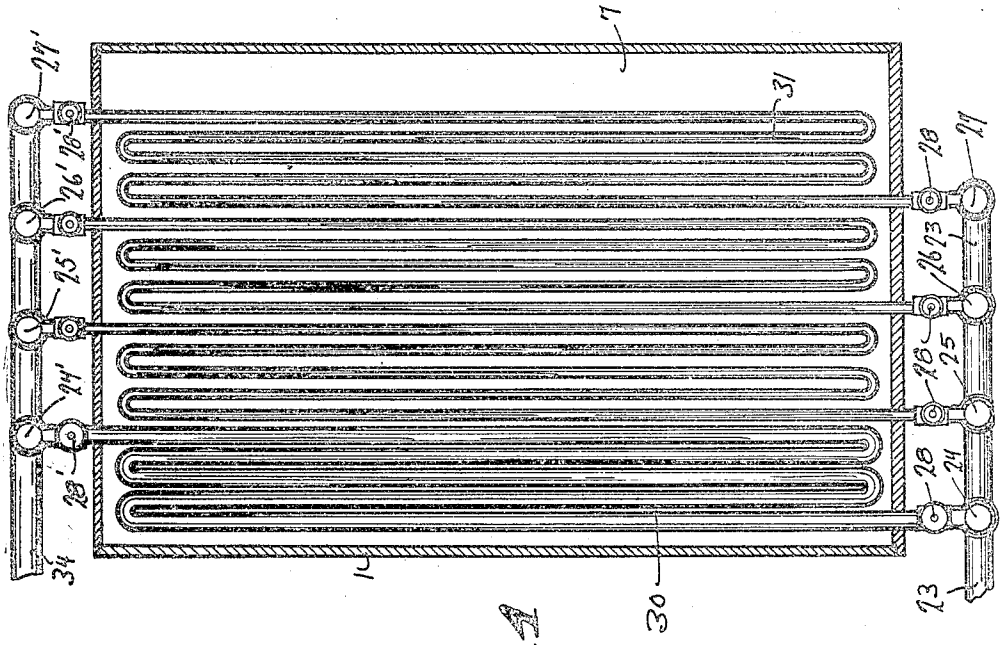


Fig. 4

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# UNITED STATES PATENT OFFICE.

WILLIAM M. LUTHER, OF SPOKANE, WASHINGTON.

## FRUIT-EVAPORATOR.

1,132,020. Specification of Letters Patent. Patented Mar. 16, 1915.

Application filed November 26, 1913. Serial No. 803,158.

*To all whom it may concern:*

Be it known that I, WILLIAM M. LUTHER, a citizen of the United States, residing at Spokane, in the county of Spokane and State of Washington, have invented new and useful Improvements in Fruit-Evaporators, of which the following is a specification.

This invention relates to improvements in fruit evaporators pertaining to that class of devices wherein a plurality of trays containing the fruit are arranged in superposed and suitably spaced relation with respect to each other, each tray being supplied independently with steam or any other heating medium or each set of trays being supplied independently of any other set, if the trays are arranged in sets.

This invention relates to an improvement in evaporators as described in my co-pending application, Serial No. 744,084, filed January 25, 1913.

An object of the present invention is to provide means whereby the steam supplied for each of the trays or sets of trays may be regulated independently of the supply of any other trays or sets of trays.

Another object of the invention is to provide an evaporator wherein the means for regulating the supply of steam are readily accessible from the outside of the evaporator casing.

Another object of the invention is to provide an evaporator with a plurality of radiators in relation to each tray or set of trays and to provide means in each of said radiators for heating certain portions of the trays or set of trays to a degree different from other portions of the same tray or set respectively, or different from the degree to which other trays or sets are heated.

Another object of the invention is to provide means in an evaporator for causing a circulation of the air by heating the air and cooling the same after the heated air has risen to a certain portion of the evaporator, the decrease in the temperature of the air causing the same again to flow downwardly and to be reheated.

Other features of novelty of the invention will be more fully described in connection with the accompanying drawing and will be more particularly pointed out by the appended claims.

In the drawings Figure 1 is a front elevation of the evaporator, Fig. 2 is a side elevation of the same, Fig. 3 shows a vertical section on line 3—3 of Fig. 1, and Fig. 4 is a horizontal section on line 4—4 of Fig. 3.

The evaporator comprises a casing 1, provided in one of the walls with a plurality of doors 2 which are adapted to swing on hinges 3 and which also may be provided with windows to facilitate the inspection of the interior of the casing without necessitating an opening of the same. A plurality of trays 5 are suitably supported within the casing and are spaced from each other. The depth of the casing is somewhat larger than the length of the trays 5 whereby an interspace 7 is left between the rear end of the trays and the rear wall 6 of the casing.

In the embodiment illustrated in the accompanying drawing the trays are arranged in sets of two and a radiator 4 is located underneath each set. A chamber 8 provided in the casing 1 below the lowermost of the sets of trays contains a plurality of additional radiators 9 and these radiators are disposed above a drip pan 10 adapted to collect the juice which drips from the fruit in the trays. The chamber 8 near the bottom of the casing mostly serves the purpose of superheating the contents of the casing and this chamber is separated from the interspace 7 by a partitioned wall 11 provided with a damper 12. A handle 13, as shown in Fig. 2, extends from the damper to the outside of the casing and serves to permit of an adjustment of the temperature from the outside of the evaporator. A similar damper 14 may also be disposed in the front wall of the casing underneath the trays to regulate the entrance of fresh air into the chamber 8. The damper 14 may be adjusted to proper position by means of the rod 15 projecting from said damper to the outside of the casing as shown in Fig. 2.

The superheating chamber 8 is normally closed. The dampers 12 and 14 are only opened when it is desired to admit fresh air or to induce a draft through the lower portion of the evaporator. The drip pan 10 in the superheating chamber may be removed through the doors 16 in the partition wall 11 and through the door 17 in the rear wall 6 of the casing.

The interior of the casing is in communication with an extension 18 wherein a plurality of pipes 19 are located, said pipes serving for conveying any suitable cooling medium through the extension 18. A drip

pan 21 disposed below the cooling pipes 19 serves for collecting the condensate from said pipes 19 and may be drained by means of the pipe 22 terminating in the bottom of the pan 21.

The heating medium may be supplied to the evaporator from any suitable source, not shown. The radiators 4 supported underneath the trays 5 in the casing are connected with the pipe 23 by means of manifolds 24, 25, 26 and 27 extending from the main pipe 23, regulating valves 28 being interposed between the manifolds and the radiators. After the passage of the heating medium through the radiators the medium is discharged into the pipe 34 which is connected with said radiators by means of manifolds 24', 25', 26', 27', the connections between the manifolds and the radiators also containing suitable regulating valves 28' as may readily be seen from Figs. 1 and 4.

From the above it will be readily understood that a heating medium to the influence of which the trays or different sets of trays may be exposed may readily be regulated from the outside of the evaporator with respect to each tray or set of trays respectively without necessitating a similar regulation with respect to any of the other trays or sets of trays.

By reference to Figs. 3 and 4 it will be noted that the radiators comprise a plurality of heating coils of different cross-section. The coil 30 located near the front wall of the casing has larger cross-section than the remaining coils of the same radiator, said other coils being indicated at 31 and by reference to Fig. 3 it will also be noted that the radiator heating the top tray comprises a heavier heating coil 30 and a heating coil 33 of smaller cross section than the heating coils 31 which act in the trays below the top tray. The heating coil 31 comprises pipes having a cross section of approximately three fourths the size of the pipes in the heating coils 30, while the pipes 33 in the top section will be approximately half the size of the pipes in the heating coils 30. The discharge main pipe 34 preferably is connected to a steam trap 35, shown in Fig. 1 of the drawing.

The air in the casing will be heated when steam is admitted to the different radiators and at the same time this air will become saturated with the moisture evaporating from the fruit. The heated air being specifically lighter than cold air has a tendency to rise and will flow from the interspace between the different trays to the interspace 7 between the trays and the rear wall 6 of the casing. This air therefore will flow upwardly in direction of the arrows as indicated at 40. When the heated air comes into contact with the cooling pipes 19 the moisture in the air will condense on these pipes and will drip into the pan 21 which is located in the extension 18 of the casing. The direction which the moisture will assume in this extension after the contact of the air with the pipes is indicated by the arrows 41 in Fig. 3. The air having been cooled by its contact with the pipes 19 has a tendency to flow in downwardly direction and is deflected by the rising air flowing through the interspace 7 so that the cooled air will travel in the path indicated by the arrows 42. The cooled air will pass down through the front of the evaporator and in its movement downwardly it will again be heated on account of the contact with the relatively large radiator coils 30 and will flow upwardly again after having been saturated with the moisture from the fruit.

In the dehydration of fruit, it is frequently desired to subject one kind of fruit successively to different temperatures. Prunes for instance should be heated at a low temperature when first introduced into the evaporator and the temperature should be raised gradually during the dehydration. This gradual increase of temperature may be effected in the present device either by an adjustment of the valves 28 on the outside of the casing 1 or it may be effected by transferring the fruit after the same has been heated for a certain period of time in one of the lower trays to the upper part of the casing. If the operator desires to continuously observe the effect of the heat on the fruit, he may dehydrate the fruit by adjusting the valves 28 of all of the radiators successively, so as to gradually admit a larger amount of heating medium into the different portions of the casing. He may also regulate the dehydration by adjusting the valves at the top to admit less steam or other heating medium than in the other portions of the casing and without varying the position of the valves, transfer the fruit primarily subjected to the action of the heating medium near the top of the casing to another portion of the casing after the fruit from said other portion has been removed. The valves 28 and 28' enable the operator to control at any time absolutely the admission of heat to any portion of the casing and to effect thereby a dehydration in accordance with the requirements necessary for treating different kinds of fruits.

The effect of the circulation upon the fruit will be that the moisture laden air is gradually removed from the contact with the fruit and the dehydration therefore may be continued to a much higher degree than was possible in devices used up to the present time. The circulation is accelerated by means of radiator coils 30 which are of larger size than the other radiator coils as they come into contact with the air after the

same has been cooled by the pipes 19. The top portion of the casing is heated to a higher degree than the remainder of the same as the heated air continuously rises and for this reason the radiator coils in the upper portion are of a smaller size than the coils in the lower part of the evaporator. The action of the rising air on the fruit to be dried has a suction effect on the moisture, a vacuum being produced which will quickly extract the moisture from the fruit.

It is obvious that a plurality of evaporators may be connected with any source of steam or other heating medium in the form of batteries and a connection of the several evaporators may easily be made by extending the steam pipes which convey the heating medium to the interior of the casing.

While I have herein shown and described one specific embodiment of my invention I do not wish to be limited thereto except for such limitations as the claims may import.

I claim:—

1. A fruit evaporator comprising in combination a casing having a front and rear wall, a plurality of trays in superposed relation supported within the casing between said walls so as to leave an interspace between said walls and the trays, a condensing chamber in communication with the casing, means for supplying a heating medium to said trays, the rear walls of the casing being adapted to direct the heated air toward the condensing chamber, there being formed between said uppermost tray and the top of said casing an air channel whereby the air after having been cooled is returned to the front end of the trays.

2. A fruit evaporator comprising in combination a casing provided with front and rear walls, a plurality of trays supported within the casing between said walls and so arranged as to provide an interspace between themselves and the front wall, means for heating the air within the casing, a condensing chamber above said trays and communicating with the casing, said rear wall being adapted to direct the heated air into the condensing chamber and the casing being so arranged that the air after having been cooled and dried in the condensing chamber is returned to the interspace between the front end of the trays and the front wall of the casing.

3. A fruit evaporator comprising in combination a casing provided with a front and rear wall, a plurality of horizontally disposed steam coils contained within said casing, superimposed trays supported within said casing intermediate said coils, the rear of said coils and trays spaced from said rear wall, the intermediate space extending the entire height of said casing and adapted to receive heated air, a condenser secured adjacent the top of said space and adapted to receive said heated air, means for cooling said heated air, and means for returning said cooled, dried air to the front of said casing, said means consisting of a space formed intermediate the uppermost tray and the top of the casing and extending to the front wall, substantially as described.

4. A fruit evaporator comprising in combination a casing including its complemental front, rear and side walls, a cooling chamber formed adjacent said rear wall and extending beyond the top of said casing, an intermediate wall contained within said casing adjacent said rear wall, a condenser positioned between said rear and intermediate wall below said cooling chamber, a series of horizontally disposed steam coils provided in said casing, at least one tray positioned intermediate each coil, the rear of said coils and trays serving to form with said intermediate wall, an air chamber adapted to guide the heated air into said cooling chamber, and means for forcing said cooled and dried air toward said front wall, said means consisting of a space formed intermediate the uppermost tray and the top of the casing and extending to the front wall, substantially as described.

5. A fruit evaporator comprising in combination, a casing including its complemental front, rear and side walls, a series of horizontally disposed coils contained within said casing, at least one tray positioned intermediate each coil, an intermediate wall extending to the uppermost tray and spaced from said rear wall and the rear of said trays and coils adapted to form a hot air channel, and a condenser positioned between said walls, a cooling chamber positioned above said casing and condenser and a return air channel formed between said uppermost tray and the top of said casing, said heated air being received in said cooling chamber and the dried cool air guided through said air channel toward and down the front of said casing, an auxiliary heating chamber positioned adjacent the base of said casing, and means adapted to regulate the amount of air received and heated by said auxiliary heating chamber.

In testimony whereof I affix my signature in the presence of two witnesses.

WILLIAM M. LUTHER.

Witnesses:

HAROLD SCANTLEBURY,

EDNA BROYLES.